CLAIMS

Sub A1

1. ~~A method of making aluminum oxynitride, the method comprising:~~
introducing aluminum oxide particles ~~into a chamber~~;
dispersing the particles ~~within~~ the chamber; and
~~forming~~ the aluminum oxynitride ~~comprising passing~~ nitrogen gas over the dispersed particles.

2. The method of claim 1, wherein forming the aluminum oxynitride comprises heating the particles.

Sub A2

3. ~~The method of claim 1, further comprising introducing carbon into the~~ chamber to form a mixture ~~comprising~~ aluminum oxide and carbon.

4. The method of claim 1, further comprising introducing a reducing agent into the chamber to form a mixture comprising aluminum oxide and the reducing agent.

5. The method of claim 1 wherein forming the aluminum oxynitride comprises heating the mixture.

Sub A3

6. ~~A method of making aluminum oxynitride, the method comprising:~~
introducing a mixture ~~comprising~~ aluminum oxide and carbon into a chamber;
~~agitating the~~ mixture within the chamber; and
heating the mixture to make aluminum oxynitride.

7. The method of claim 6, further comprising:
introducing nitrogen gas into the chamber.

8. The method of claim 6, wherein agitating the mixture comprises rotating the chamber.

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9. ~~The method of claim 6, further comprising~~:
cooling the aluminum oxynitride;

removing the aluminum oxynitride from the chamber; and

introducing a second mixture comprising aluminum oxide and carbon into the chamber.

10. The method of claim 6, further comprising:

forming the aluminum oxynitride into a transparent structure.

11. The method of claim 10, wherein forming the aluminum oxynitride comprises:

forming a green body comprising the aluminum oxynitride; and

sintering the green body.

12. The method of claim 11, further comprising:

isostatically pressing the sintered green body under heat.

13. The method of claim 6, wherein the aluminum oxynitride comprises $Al_{23-1/3x}O_{27+x}N_{5-x}$, where $0.429 \leq x \leq 2$.

14. A method of making aluminum oxynitride, the method comprising:

introducing a first reaction mixture comprising aluminum oxide and carbon into a chamber;

agitating the first reaction mixture within the chamber;

heating the chamber to a temperature to form aluminum oxynitride from the first reaction mixture;

removing the aluminum oxynitride while maintaining the temperature of the chamber; and

introducing a second reaction mixture comprising aluminum oxide and carbon into the chamber while maintaining the temperature of the chamber.

15. The method of claim 14, further comprising:

introducing nitrogen gas into the chamber.

16. The method of claim 14, wherein introducing the first reaction mixture comprises introducing the first reaction mixture from a hopper.

17. The method of claim 14, wherein agitating the first reaction mixture comprises rotating the chamber.

18. The method of claim 14, wherein the chamber comprises an exit opening and removing the aluminum oxynitride comprises retracting a plunger within the chamber, thereby allowing the aluminum oxynitride to flow through the exit opening.

19. The method of claim 14, further comprising:
forming the aluminum oxynitride into a transparent structure.

20. The method of claim 19, wherein forming the aluminum oxynitride comprises:
forming a green body comprising the aluminum oxynitride; and
sintering the green body.

21. The method of claim 20, wherein forming the aluminum oxynitride comprises:
isostatically pressing the sintered green body under heat.

22. The method of claim 14, wherein the aluminum oxynitride comprises $Al_{23-1/3x}O_{27+x}N_{5-x}$, where $0.429 \leq x \leq 2$.

23. An aluminum oxynitride made according to the method of claim 6.

24. The aluminum oxynitride of claim 23, wherein the aluminum oxynitride comprises $Al_{23-1/3x}O_{27+x}N_{5-x}$, where $0.429 \leq x \leq 2$.

25. A method of making aluminum oxynitride, the method comprising:
heating a chamber;
continuously introducing a reaction mixture comprising aluminum oxide and carbon into the chamber;
agitating the reaction mixture within the chamber; and